

L Number	Hits	Search Text	DB	Time stamp
1	1	("6330346").PN.	USPAT; US-PGPUB	2002/03/05 13:18
4	85	infrared same spectrometer same (tissue or skin or iris or eye)	USPAT; US-PGPUB	2002/03/05 13:19
7	10	(infrared same spectrometer same (tissue or skin or iris or eye)) and (identif\$9 or verifi\$ or recogni\$9).ab.	USPAT; US-PGPUB	2002/03/05 13:39
10	2	TOPPING-ALANSON-D TOPPING-ALLEN	USPAT; US-PGPUB	2002/03/05 13:45
13	6	("4236082" "4614366" "4785171" "4856891" "4881268" "5359669").PN.	USPAT; US-PGPUB	2002/03/05 13:45
16	1073	("382/115-127").CCLS.	USPAT; US-PGPUB	2002/03/05 13:46
19	0	(("382/115-127").CCLS.) and spectromet4er	USPAT; US-PGPUB	2002/03/05 13:46
22	2	(("382/115-127").CCLS.) and spectrometer	USPAT; US-PGPUB	2002/03/05 13:46
25	12	("3811116" "4142601" "4592443" "4613845" "4641349" "4725824" "4728939" "4953111" "4978303" "4996151" "4997770" "5291560").PN.	USPAT; US-PGPUB	2002/03/05 13:47

L Number	Hits	Search Text	DB	Time stamp
1	7086	(spectra or spectrum or spectrometer) same (subcutaneous or skin or tissue or epidermis)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
8	768	((spectra or spectrum or spectrometer) same (subcutaneous or skin or tissue or epidermis)) same infrared	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
15	1	((spectra or spectrum or spectrometer) same (subcutaneous or skin or tissue or epidermis)) same infrared) and biometric\$6	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
22	10	((spectra or spectrum or spectrometer) same (subcutaneous or skin or tissue or epidermis)) same infrared) and (recogni\$9 or identif\$9).ti.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:00
29	10	((spectra or spectrum or spectrometer) same (subcutaneous or skin or tissue or epidermis)) same infrared) and (recogni\$9 or identif\$9 or verif\$9).ti.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:12
36	45883	(spectra or spectrum or spectrometer) and (subcutaneous or skin or tissue or epidermis)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
43	9344	((spectra or spectrum or spectrometer) and (subcutaneous or skin or tissue or epidermis)) and infrared	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
50	35	((spectra or spectrum or spectrometer) and (subcutaneous or skin or tissue or epidermis)) and infrared) and biometric\$6	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:02
57	1926	(recogni\$9 or identif\$9 or verif\$9) with infrared with spectr\$2	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:13
64	63	((recogni\$9 or identif\$9 or verif\$9) with infrared with spectr\$2) and (comparison) with (stored or reference or template)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB	2002/03/05 17:22
71	8	biometric\$8 and (spectra or spectrum or spectrometer)	EPO; JPO; DERWENT	2002/03/05 17:31
75	1073	("382/115-127").CCLS.	USPAT; US-PGPUB	2002/03/05 17:31
78	2	("382/115-127").CCLS.) and infrared and spectrometer	USPAT; US-PGPUB	2002/03/05 17:32
81	53	("382/115-127").CCLS.) and infrared and spectr\$2	USPAT; US-PGPUB	2002/03/05 17:32

L Number	Hits	Search Text	DB	Time stamp
1	18	OTT-JAMES-H	USPAT; US-PGPUB	2002/03/05 17:52
4	0	OTT-JAMES-H and infrared	USPAT; US-PGPUB	2002/03/05 17:53
7	10	OTT-JAMES-H and (light or illuminat\$4)	USPAT; US-PGPUB	2002/03/05 17:55
10	1	("6343140").PN.	USPAT; US-PGPUB	2002/03/05 18:03
13	1	("5793881").PN.	USPAT; US-PGPUB	2002/03/05 18:04
16	1	("4,932,776").PN.	USPAT; US-PGPUB	2002/03/05 18:04

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3	212	("382/115").CCLS.	USPAT; US-PGPUB	2002/03/05 11:24
6	15	("3648240" "4467545" "4699149" "4785171" "4857916" "4932776" "4946276" "5088817" "5103486" "5230025" "5335288" "5351303" "5546471" "5569291" "5787185").PN.	USPAT; US-PGPUB	2002/03/05 09:50
9	1	"4728186".PN.	USPAT; US-PGPUB	2002/03/05 09:51
12	0	6330346.URPN.	USPAT; US-PGPUB	2002/03/05 09:52
15	6	("4336998" "4358677" "4394773" "4492958" "5719950" "5737439").PN.	USPAT; US-PGPUB	2002/03/05 09:53
18	356	("250/339.1,341.8").CCLS.	USPAT; US-PGPUB	2002/03/05 11:25
21	559	("250/339.07,559.44,316.1").CCLS.	USPAT; US-PGPUB	2002/03/05 11:25
24	13	((("250/339.1,341.8").CCLS.) and spectrum and (identification or recogintion or verification) and (skin or tissue or subcutaneous)	USPAT; US-PGPUB	2002/03/05 11:31
27	5	((("250/339.07,559.44,316.1").CCLS.) and infrared and spectr\$2 and (identification or recogintion or verification) and (skin or tissue or subcutaneous)	USPAT; US-PGPUB	2002/03/05 11:34
30	3	((("382/115").CCLS.) and infrared and spectr\$2 and (skin or tissue or subcutaneous)	USPAT; US-PGPUB	2002/03/05 11:34

09/415,594

United States Patent

Wunderman et al.

(12) Patent Number: 6,122,042
(42) Date of Patent: Sep. 19, 2000

[54] DEVICES AND METHODS FOR OPTICALLY IDENTIFYING CHARACTERISTICS OF MATERIAL OBJECTS

[75] Inventors: Irwin Wunderman, 685 Eureka Ave., Mountain View, Calif. 94040-3875; Adolph E. Smith, 502 Moore Creek Rd., Santa Cruz, Calif. 95060-2345; Vijay K. Lumba, 5077 Bower Ct., San Jose, Calif. 95146

[21] Appl. No.: 08/885,661

[22] Filed: Jul. 1, 1997

[50] Related U.S. Application Data
Provisional application No. 60/039,308, Feb. 7, 1997.

[51] Int. Cl.⁷ G01N 11/00

[52] U.S. Cl. 356/73; 356/343

[56] Field of Search 356/73; 250/343

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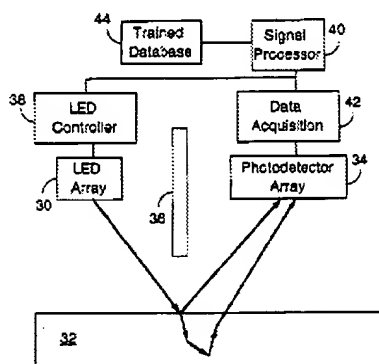
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Primary Examiner—Frank G. Font
Assistant Examiner—Reginald A. Ratliff
Attorney: Agent, or Firm—Lumen Intellectual Property Services

[57] ABSTRACT

An apparatus for photometric analysis and/or identification of properties of a material object comprises a collection of light sources having substantially distinct wavelength envelopes and arranged in a rigid sequence of distinct combinations. The apparatus comprises a collection of spatially distributed light detectors which detect radiation from the object and produce detected signals. A signal processor for controlling the light sources and analyzing the detected signals synchronizes the detected signals with the activation of the sequence of distinct combinations of the light sources to produce associated combinations of detected signals which are then analyzed to determine a physical property of the object and/or compared for similarity to previously detected signals from known objects. The photometric data may be combined and correlated with other measured data to enhance identification.

61 Claims, 18 Drawing Sheets



US-PAT-NO: 6122042

DOCUMENT-IDENTIFIER: US 6122042 A

TITLE: Devices and methods for optically identifying characteristics of material objects
DATE-ISSUED: September 19, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	RULE 4
Wunderman, Irwin	Mountain View	CA	94040-387	N/A	N/A
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Lumba, Vijay K.	San Jose	CA	95060-234	N/A	N/A
			5		
			95148		

APPL-NO: 6/ 886561

DATE FILED: July 1, 1997

PARENT-CASE:

CROSS-REFERENCE TO RELATED APPLICATIONS The present application claims priority from provisional patent application 60/039,308 filed Feb. 7, 1997, which is incorporated herein by reference. The present application is related to disclosure document No. 800093 deposited Aug. 22, 1995.

INT-CL: [7] G01N021/00

US-CL-ISSUED: 356/73,356/343

US-CL-CURRENT: 356/73,356/343

FIELD-OP-SEARCH: 356/73,250/343

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ART-UNIT: 287

PRIMARY-EXAMINER: Font, Frank G.

ASSISTANT-EXAMINER: Ratliff, Reginald A.

ATTY-AGENT-FIRM: Lumen Intellectual Property Services

ABSTRACT:

An apparatus for photometric analysis and/or identification of properties of a material object comprises a collection of light sources having substantially

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Barry, N.P.; Jones, R.; Hyde, S.C.W.; Dainty, J.C.; French, P.M.W.

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(finge*) and spectr* <near/2> infrared

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Page(s): 693 -695 vol.2

Page(s): 693 -695 vol.2

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Page(s): 104 -109

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Proceedings☐ Standards

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Page(s): 703 -708 vol.2

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Lightwave Technology, Journal of , Volume: 18 Issue: 1 , Jan. 2000

Page(s): 57 -65

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Poulos, M.; Rangoussi, M.; Chrissikopoulos, V.; Evangelou, A.

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Page(s): 283 -286 vol.1

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Poulos, M.; Rangoussi, M.; Chrissikopoulos, V.; Evangelou, A.

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Page(s): 1005 -1008 vol.2

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Personal Wireless Communication, 1999 IEEE International Conference on , 1

Page(s): 39 -43

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Ben Hamida, A.

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Page(s): 1187 -1192 vol.3

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Ghaemmaghami, S.; Deriche, M.
Acoustics, Speech and Signal Processing, 1998. Proceedings of the 1998 IEEE International Conference on , Volume: 2 , 1998
Page(s): 597 -600 vol.2

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11 Graphical representation of heart sounds and murmurs
Tovar-Corona, B.; Torry, J.N.
Computers in Cardiology 1997 , 1997
Page(s): 101 -104

[\[Abstract\]](#) [\[PDF Full-Text \(348 KB\)\]](#) [CNF](#)

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MODIS data
Kalluri, S.N.V.; Huang, C.; Mathieu-Marni, S.; Townsend, J.R.G.; Yang, K.; Ch R.; Fleig, A.
Geoscience and Remote Sensing, 1997. IGARSS '97. Remote Sensing - A Scie Vision for Sustainable Development., 1997 IEEE International , Volume: 1 , 19
Page(s): 171 -173 vol.1

[\[Abstract\]](#) [\[PDF Full-Text \(240 KB\)\]](#) [CNF](#)

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Sudo, K.; Yamato, J.; Tomono, A.
Multisensor Fusion and Integration for Intelligent Systems, 1996. IEEE/SICE/ International Conference on , 1996
Page(s): 641 -646

[\[Abstract\]](#) [\[PDF Full-Text \(528 KB\)\]](#) [CNF](#)

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time-domain dielectric relaxation spectroscopy
Liedermann, K.
Electrical Insulating Materials, 1995. International Symposium on , 1995
Page(s): 367 -370

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Keller, P.E.; Kouzes, R.T.

Nuclear Science Symposium and Medical Imaging Conference, 1994., 1994 IE
Conference Record , Volume: 1 , 1995
Page(s): 341 -345 vol.1

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systems**

Manohar, R.

Personal Wireless Communications, 1994., IEEE International Conference on
Page(s): 135 -141

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Keller, P.E.; Kangas, L.J.; Troyer, G.L.; Hashem, S.; Kouzes, R.T.

Nuclear Science, IEEE Transactions on , Volume: 42 Issue: 4 Part: 1-2 , Aug.
Page(s): 709 -715

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Miller, B.

IEEE Spectrum , Volume: 31 Issue: 2 , Feb. 1994
Page(s): 22 -30

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Lemson, P.; Palmer, C.; Coursey, C.

Communications, 1993. ICC '93 Geneva. Technical Program, Conference Reco
International Conference on , Volume: 1 , 1993
Page(s): 589 -593 vol.1

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Priebe, R.; Wilson, G.

Time-Frequency and Time-Scale Analysis, 1992., Proceedings of the IEEE-SP

International Symposium , 1992
Page(s): 349 -352

[\[Abstract\]](#) [\[PDF Full-Text \(276 KB\)\]](#) **CNF**

22 PCS in the US and Europe

Taylor, J.T.

IEEE Communications Magazine , Volume: 30 Issue: 6 , June 1992

Page(s): 48 -50

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Oglesby, J.; Mason, J.S.

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Page(s): 393 -396 vol.1

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Mahmoud, S.A.; Afifi, M.S.; Green, R.J.

Aerospace and Electronic Systems, IEEE Transactions on , Volume: 26 Issue: 1990

Page(s): 586 -598

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Tovar-Corona, B.; Torry, J.N.

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Page(s): 171 -173 vol.1

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time-domain dielectric relaxation spectroscopy**

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Page(s): 709 -715

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Page(s): 586 -598

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